

in obliterating dark lines than bright ones. Prof. Wood's suggestion as to reducing the effective intensity of the truly continuous spectrum by passing the light through a suitably placed Nicol's prism, would accordingly be specially applicable to the inner corona.

Prof. Wood has obtained experimental evidence on a point to which attention was drawn many years ago by Ranyard (*Mem. R.A.S.*, vol. xli, p. 353), namely, that if the solar light be reflected by small particles in the corona, the reflected rays will be deficient in the rays of greater wave-length. In this way the bolometric observations indicating that the corona was cooler than the bolometer are partly explained. Is it possible that the observations are to be completely explained by further supposing that the bolometer strip was outside the image of the shallow inner corona, which is probably the chief part of the corona directly emitting light and heat? The image thrown on the strip appears to have been little more than one-third of an inch in diameter, and in the account of the observations Mr. Abbot simply states that the image was brought almost tangent to the strip, so that the strip may very well have been 4 or 5 minutes from the sun's limb.

At all events, there seems to be no sufficient ground, as yet, for rejecting the view that the luminosity of the outer corona is largely due to reflected solar light, while that of the inner corona is partly due to the incandescence of solid or liquid particles and partly to gaseous radiations. A. FOWLER.

Royal College of Science, South Kensington, February 9.

#### Malaria and Mosquitoes.

I THINK most of those who have had much experience of the Indian jungles would be prepared to corroborate the remarks made by Mr. D. E. Hutchins in last week's NATURE (p. 371), and would perhaps be inclined to think there may be something in the opinion alluded to by him, that "Dr. Ross's splendid discovery does not quite cover the whole ground." In 1873-4 I spent some months in the notoriously malarious region at the foot of the Darjiling Himalayas, which contained some tea gardens here and there at that period, while many new ones were being opened out. The planters suffered greatly from malarial fever, and I was told by several that it was far more prevalent, and of a worse type, on gardens in process of formation, by clearing the jungle and breaking up the ground, than on either the undisturbed jungle itself or on gardens that had existed for some time. In other parts of India my camp has suffered badly from malarial fever when mosquitoes were certainly not prevalent, and when, to the best of my belief, there were none, or perhaps I should rather say, none made themselves noticeable by stinging.

On the other hand, when in Upper Assam in 1874-5, I was informed by some of the planters there, and it seemed to be a commonly received opinion, that mosquito curtains were a valuable protection from malaria. Of course at that period no explanation could be given for the supposed fact, which seemed a very mysterious one, as for the invisible 'germs,' which were thought by some to float in the air, to be excluded by curtains of ordinary mesh would be something like a man being prevented from crossing a road through inability to squeeze himself between the milestones.

18 The Common, Ealing, February 12. F. R. MALLET.

#### Audibility of the Sound of Firing on February 1.

THE following note was recorded here (at Littlemore, Oxford) immediately after I was called away from listening; and as it is more detailed than any I have seen, I daresay you will think it worth printing.

I held my watch in my hand and observed the sequence of the booms for some ten or twelve successive minutes. The second one showed there was regularity, and after the third the facts were clear. The sounds reached us thus:

os. to 20s., continuous unbroken roll of guns of slightly different strength.  
 20s. to  $\pm$  24s., silence for 4s. or 5s.  
 $\pm$  24s. to  $\pm$  29s., similar roll.  
 $\pm$  29s. to  $\pm$  34s., silence for 3s. or 4s.  
 $\pm$  34s. to  $\pm$  38s., a similar roll.  
 $\pm$  38s. to 42s., silence to just the 42s.  
 42s. to 45s. exactly, a short roll culminating in three or four guns much louder than any of the preceding ones.  
 45s. to 60s. exactly, dead silence for a quarter minute.

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This recurred with such perfect regularity that there was no doubt whatever about the precision of the observation.

Then I had to ride away on a bicycle about a mile, where I met another cyclist, and we stopped and listened again. The long 20s. roll was now missing, but punctual to the second or two came all the others, the last one with big guns precise.

It seems likely that the long roll was the simultaneous salute of the long line of ships; but I have not yet noticed any authoritative statement as to how the saluting was done. It was interesting to think that at any moment while we were listening there were no fewer than six other such salutes travelling up towards us from the Solent.

From the strength of the sounds I should quite agree with the opinion expressed in Oxford that they might well be heard another twenty miles.

W. J. HERSCHEL.

February 12.

#### The Origin of the "Tumbling" of Pigeons.

IN reading the account of tumbler pigeons in Darwin's "Animals and Plants under Domestication," the question arose to what the habit of "tumbling" might be due.

I have since seen, in a report of an address by Prof. J. A. Thomson to the North British Branch of the Pharmaceutical Society, a statement that the peculiarities of movement of the Japanese waltzing mouse are due to the fact that only one of its semi-circular canals is developed.

It occurred to me that a similar condition might explain the movements of the tumbler. I should be much obliged if you or any of your readers could tell me where information concerning either of these examples is to be found.

E. P.

February 3.

[Prof. Thomson's statement is not quite accurate. The paper to which he referred is undoubtedly that by Rawitz, in *Archiv. f. Anat. and Physiol.* (Physiol. Abth.), 1899, pp. 236-244, where it is shown that of the three canals the anterior is alone normal, and that the other two—though reduced and abnormal in their inter-relationship—are present.

The physiology of the organ has been since experimentally investigated by Alexander and Kreidl, whose paper is in Pfleiderer's *Archiv. f. Ges. Physiologie* (Bd. 82, pp. 541-552); and as to the pigeons, they, too, have all three canals well developed. Concerning their membranous labyrinth, some experiments of interest were made in, I think, the early nineties by Spamer and others, and an account of these and of allied investigations bearing on the question raised (by McBride) will be found in the *Journ. Anat. and Physiol.* (vol. xvii. pp. 211-217). There does not appear to be any foundation for the view to which the writer of the letter inclines.—G. B. HOWES.]

#### Lummer's "Photographic Optics."

THE interesting review of Prof. Silvanus Thompson's translation of Dr. Otto Lummer's "Photographic Optics," which was published in NATURE on January 3, has come under my notice. I should be obliged if you would permit me to correct a mistake which occurs both in Prof. Thompson's book and the review. Concerning the two views of Munich published in Prof. Thompson's work, which are there attributed to Dr. Miethe, you remark: "Miethe's two views of Munich from a distance of about two miles—the one taken with an ordinary lens, the other with the teleobjective—show what a powerful weapon the latter is."

Both the views in question were taken by my firm, one with an antiplanet and the other with this antiplanet in combination with a magnifying system (negative lens) as a teleobjective of our own construction and manufacture. I send you a prospectus of my firm concerning the said teleobjective and containing also the two views of Munich.

I also observe another error in Prof. Thompson's work; the lenses recently introduced by Messrs. R. and J. Beck being described on p. 80 as Messrs. Voigtländer's Collinears, instead of our orthostigmats, for which I have given them a manufacturing license, as you will see in the notice on page 1 of the prospectus I also send by book post.

RUDOLF STEINHEIL.

München, February 5.

NOTHING could have been further from my intention than to do any injustice to Dr. Steinheil or his firm, and I hasten to acknowledge the justice of his criticisms upon the slips

contained in my edition of Lummer's book-- slips for which I take the entire responsibility. The error on p. 100 in supposing that the Munich view was photographed by Prof. Miethe, of Berlin, arose from a confusion between two sets of telephotographic views sent me from Germany, some of which were taken by Prof. Miethe. I would point out that, in the only case in which the kind of lens used is stated, it is correctly stated to be a Steinheil's lens. I presume Dr. Steinheil is not dissatisfied with the performance of the lens in producing the picture, by whomsoever it was photographed. The other point arose from inserting at the last moment, when the sheets were going to press, a reference to Messrs. R. and J. Beck, which should have been inserted at the end of paragraph four instead of paragraph three of Chapter xi. Let me assure Dr. Steinheil that both points will be corrected in any fresh issue of the text.

February 9.

SILVANUS P. THOMPSON.

#### The Ash Constituents of Some Lakeland Leaves.

ALTHOUGH it cannot be maintained that the amount of inorganic matter which the leaves of a tree extract from the soil on which it grows is quite independent of the chemical composition, &c., of that soil, it was deemed advisable to perform a few experiments bearing on this particular feature. Notwithstanding the considerable elevation, viz. about 400 feet, the soil in this locality is distinctly suited and adapted to the growth and healthy development of most of our well-known forest trees. It is a cold, basic clay, mostly not very stiff, on account of the presence of some gravel and peat in many places, and, generally speaking, enriched with considerable quantities of potash, silica and manganese, while a serious deficiency in lime is attested by the universal prevalence of distinctly calcifuge plants. The percentage of crude ash set down in the subjoined table was calculated from the combustion of the leaves gathered in the evening, dried first in the air and then at 100° C. The details are as described :--

Leaves of	Date	Percent- age of crude ash	Percentage of lime (CaO) and of silica (SiO <sub>2</sub> ) in the crude ash
Sycamore ...	May 16	5·6	
" ...	July 5	6	
" ...	Aug. 13	10·5	
" ...	Sept. 13	13	
" ...	Oct. 11	14·2	27SiO <sub>2</sub> & 33·3 CaO.
" (brown)	Oct. 28	15	
Wych elm ...	June 10	7·8	
" ...	July 19	11	
" ...	Sept. 1	13·2	
" (yellow)	Oct. 17	18	30SiO <sub>2</sub> & 32·3 CaO.
Rowan ...	May 30	5·5	
" ...	Aug. 2	6	
" ...	Sept. 15	6·6	
" and stalks (red)	Oct. 28	6·6	12SiO <sub>2</sub> & 35·3 CaO.
Com. beech ...	Sept. 26	5·38	22·8SiO <sub>2</sub> & 33·1 CaO.
Copper beech ...	Oct. 2	6·9	
Birch (600 ft.) ...	Sept. 6	2·8	
Scots pine ...	Aug. 28	2·5	

The steady increase in the quantity of ash in the leaves of sycamore and wych elm as the season progresses is here exhibited with sufficient emphasis. The peculiarity, however, is that in the case of the sycamore the percentage does not reach the figure that it might do on other soils or under other circumstances; for instance, according to Schleiden and Schmidt, it might come up to 28 per cent.; but this proportion, I make bold to say, is never attained in any part of British Lakeland. The surprisingly large percentage of silica and lime in the ash of the deep crimson leaves and petioles of the rowan demands further investigation, inasmuch as this is a rather calcifuge tree, and the amount of silica in other allied Rosaceans is very small. According to Rismuller, the ash of dry beech leaves is 4·6 per cent. on May 7 and 11·4 per cent. on November 18; whereas Gueymard found that when gathered after natural fall and dried they yield only 5·6 per cent. ash, and my experiments do not warrant the assumption of any serious difference.

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as respects inorganic constituents between the vernal and autumnal foliage of this tree. "Alone among the species of the first order of Mid and North Europe," says MM. Fliche and Grandjeau, "the Scots pine seems to seek out siliceous soils, but the physical rather than the chemical conditions of the soil seem, as regards this species, to have a preponderant influence." Nevertheless, the percentage of ash in its first and second years' leaves is precisely the same here as it is in North Germany, and the extremely moderate inorganic pabulum that suffices to sustain it and the birch enables them to bear the privations of an upland abode.

P. Q. KEEGAN.

Patterdale, Westmorland.

#### An Earthquake on February 10.

IN the early hours of February 10, in the town of Grazalema, there was experienced an intense earthquake, with damages to buildings, many of them being rent.

The duration was about three seconds, and the movement a compound one of oscillation and trepidation, accompanied with considerable noise.

The people ran out of the houses full of terror.

The church of Saint Joseph and some other large buildings have been very severely damaged, and also factories and mills.

The body of water that provided motive power for the machinery in one of the factories has disappeared.

Grazalema is a town of 10,000 inhabitants, situated in a hilly district of the province of Cadiz, at about 70 kilometres, nearly due north, from Gibraltar.

AUGUSTO ARCMIS.

Instituto Central Meteorologico, Madrid, February 13.

#### The late Prof. Hermite.

YOUR interesting memoir of Prof. Hermite differs in one detail from the account in "Men and Women of the Time." It is said there that he was born at Dieuze, in Lorraine, and that he was for a while at Nancy before going to Paris.

W. B. C.

#### THE RADIO-ACTIVITY OF MATTER.

AT the commencement of the year 1896, in carrying out some experiments with the salts of uranium, the exceptional optical properties of which I had been studying for some time, I observed that these salts emitted an invisible radiation, which traversed metals and bodies opaque to light as well as glass and other transparent substances. This radiation impressed a photographic plate and discharged from a distance electrified bodies--properties giving two methods for studying the new rays.

The phenomenon does not appear to be influenced by any known external cause, such as a variation of temperature or a luminous excitation; it is entirely different from phosphorescence; is not weakened in an appreciable manner by time, even at the end of several years; and is emitted spontaneously without any apparent exciting cause. The radiating property appeared, firstly, to be bound up with the presence of the chemical element uranium; the metal discharges electrified bodies three to four times faster than its salts.

If some fragments of uranium or of one of its salts are placed upon a photographic plate wrapped in black paper or covered by an aluminium leaf, and if between the uranium and the plate various substances are interposed, there is obtained at the end of several hours or days, radiographs showing that the radiation is propagated in straight lines, and traverses different bodies unequally. In the radiographs the edges of the plates of glass, or of thin plates of other substances, throw a sort of shadow, which is still unexplained. This phenomenon, as well as an inequality obtained twice accidentally through parallel and crossed tourmalines, led to the belief at the commencement of these researches that these rays had properties in common with light. But all the later experiments have shown that the new radiation undergoes neither reflection, refraction nor polarisation.